

# SDG12 Future of Innovation and Enterprise

## MM5: Introduction to Engineering for Good



### Micro-Module 5: Introduction to Engineering for Good

#### Exploration and Experimentation

#### Lesson 5: Waste Not, Want Not 2

Subjects: Applied  
Technology, Climate  
Action and Sustainable  
Development, Digital  
Literacy, Technology

#### Lesson Title and Summary: Waste Not, Want Not 2

In Waste Not, Want Not 2, learners will apply the Engineering Design Process to designing and testing a system for waste separation and management.

#### Vocabulary: Reduce, Reuse, Recycling, Materials Recovery Facility

#### In this lesson, the learner will...

- learn about how creative technology can be applied to clean up global waste
- work collaboratively with peers on a recycling- related problem
- plan, design, sketch and build a recycling system

#### Materials:

- Worksheet: Waste Design Challenge
- Teachers' Guide
- Notebooks
- Pen/Pencil
- Paper
- A variety of clean, dry recyclables in a single, large recycling bin
- Four smaller bins (one for plastic, one for metal, one for glass, and one for paper)
- A long table
- A selection of craft materials including, but not limited to: bin bags, hand fans, small magnets, plastic tubs, netting, paper, plastic cups, straws, tape etc.



# MM4: Introduction to Engineering for Good

## L5: Waste Not, Want Not 2



### Activity Instructions

#### Activity 1: Waste review (15min)

1. Review the work done in the previous lesson, using the following group discussion prompts. See Teachers' Guide.
  - What key types of waste can be recycled in Ireland?
  - What is the difference between REDUCE, REUSE and RECYCLE?
  - How can we REDUCE, REUSE and RECYCLE?

#### Activity 2: Waste Design Challenge- Define & Ideate (35min)

1. Ask learners to form teams of 2-3 people.
2. Using Worksheet: Waste Design Challenge, support learners to move through the Define and Ideate stages of the challenge.

#### Reflective Exercise: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One opinion they have about the tasks

Use Post-its or a mentimeter survey - [www.mentimeter.com](http://www.mentimeter.com) - to gather reflections

# MM4: Introduction to Engineering for Good

## L5: Waste Not, Want Not 2



### Extension / Reduction Activities

Reduction: For a shorter class, reduce timing of Activity 1.

Extension: For a longer class, give learners more time to define and ideate.

### Media (materials, online video links, extra resources, case studies etc)

Repak: Ireland's leading environmental not for profit organisation: [repak.ie](http://repak.ie)

Engineering Design Process [1:47min] <https://www.youtube.com/watch?v=b0ISWaNoz-c>

Modernising design for minimal waste [19:31min] [https://youtu.be/TJNl3vWj2\\_I](https://youtu.be/TJNl3vWj2_I)

Sources of Marine Litter [3:50 mins] <https://www.youtube.com/watch?v=017bBeXhYz4&t=1s>

Recycling – how to [3:00 mins] <https://www.youtube.com/watch?v=sZZsBedy0CU&t=81s>

Zero waste challenge: [5:36 mins] <https://www.youtube.com/watch?v=KtTTnEePeAQ>

### Local Tips / Expertise / Additional Work and Assessments

Contact or take a trip to your local Materials Recovery Facility or recycling bins to see the process of recycling.

Contact local waste disposal, e.g., KWD, Panda, etc., to see how waste is handled.

Find local organisation or individuals who use recycled or reused materials in their business. Invite local authority environmental officer to speak to the class. Have learners devise questions in advance.



### Waste review

#### What key types of waste can be recycled in Ireland?

- Paper and Cardboard: This category typically includes newspapers, magazines, cardboard boxes, and other paper-based materials.
- Glass: Glass bottles and jars are commonly recyclable. In some places, different colours of glass may be sorted for recycling.
- Plastic: Certain types of plastic can be recycled. In Ireland, recycling symbols on plastic packaging indicate the type of plastic and whether it is recyclable.
- Metal: Aluminium and steel cans are often recyclable. Metals from household items like tin cans may also be included.
- Textiles: Some areas have textile recycling programs where old clothes and textiles can be collected for recycling or reuse.
- Organic Waste: Food waste and garden waste can be recycled through composting or specialized organic waste recycling programs.
- Electronic Waste (WEEE): Certain electronic items, such as old computers and appliances, can be recycled through designated electronic waste collection points.
- Batteries: Used batteries may have designated collection points for recycling.

It's important to note that recycling programs and accepted materials can vary by location and may be subject to change. For the most up-to-date and accurate information, it is recommended to check with local waste management authorities or recycling facilities in Ireland.

#### What is the difference between REDUCE, REUSE and RECYCLE?

- Reducing, reusing, and recycling are crucial components of sustainable living, playing a significant role in minimising the volume of waste that needs disposal.
- Reduce = all about creating less waste by purchasing and using less.
- Reuse = how you can use certain items again (ideally multiple times) before replacing them.
- Recycle = making sure you separate items that can be recycled, meaning they can be used for a new purpose.
- Ideally we want to REDUCE our use of items, by RETHINKING how we shop for and consume products.
- Avoiding single-use plastics means that we are more likely to REUSE items that we buy.
- Be educated about recycling in your local area as it can differ place-to-place.



### Waste review

#### How can we REDUCE, REUSE and RECYCLE?

- Only buy what you need
- Buy products that don't use packaging
- Carry reusable shopping bags and other reusable items (steel or glass straws, stainless steel water bottle, cutlery etc)
- Use keep cups & travel mugs
- Reuse plastic plates, cups and bags by cleaning & using again
- Learn what can be recycled in your local area- and importantly, what CANNOT!
- Organise and sort bins correctly

Are there additional 'R's to consider? Occasionally, two more 'R's can be included alongside the fundamental three.

- "Rethink" encourages us to think about how our actions influence the environment.
- "Recover" refers to the practice of repurposing waste products. For instance, the decomposition of garbage generates methane gas, which can be recovered and utilised as a source of energy through combustion.



### Challenge

Design a system to sort a mixed-up bin of recycling. The system must be able to separate recyclables into four categories (plastic, glass, metal & paper). You can help run the system by taking the place of some machinery, but you cannot handle the recyclables directly. Paper material must be kept dry

### Define the challenge

1. Read through the design challenge and summarise under the following headings.
  - Task
  - Criteria (what must be included)
  - Limitations

### Design Materials

- variety of clean, dry recyclables in a single recycling bin
- 4 smaller (empty) bins
- 1 long table
- selection of craft materials (i.e. bin bags, small fans, magnets, plastic tubs, nets, paper, straws, tape)

### Optional

- hair dryer
- ladder/stool (to allow for height changes)

2. Discuss the materials you will be given to build a prototype of your system.

Think about...

- the weight of the recyclables
- the shape of the recyclables
- are any of them magnetic?
- can you use gravity?
- can you use motion/rotation etc?

### Ideate

1. In your team, start to brainstorm some of your ideas. Remember the criteria and limitations of the challenge.
2. Decide on 1-2 of your best ideas and share with the whole class.
3. Watch some of these videos to help you develop your ideas.

Modernising design for minimal waste [19:31min]

[https://youtu.be/TJNl3vWj2\\_I](https://youtu.be/TJNl3vWj2_I)

Recycling – how to [3:00 mins]

<https://www.youtube.com/watch?v=sZZsBedy0CU&t=81s>

A day in the life of one of Ireland's busiest recycling centres [2:32min]

<https://youtu.be/ZzX7y17X3o0>

## L5 TO L7: MM5 WASTE DESIGN CHALLENGE

12 RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



### Ideate- continued

3. Give feedback to each team on their ideas and make a note of the feedback your team receives.
4. Incorporate others teams suggestions into your solutions and ideas

### Empathise

1. Develop a short profile on the users of your waste sorting system.
  - Where is the system located? What type of area?
  - What types of people will manage and run the system? Is there anything about them you need to consider?

### Prototype - paper design

1. Design your waste sorting system on paper. Use diagrams and labels to show how the system works and will be used. Remember the criteria and limitations of the challenge.
2. Share your designs as a whole class. Give feedback on other team's paper design and make a note of any feedback you receive.
3. Incorporate others teams suggestions into your design.

### Prototype - build

1. Now it is time to build! Using your paper design and the materials provided, build a working prototype to test.
2. Conduct mini tests as you build and amend your design as needed. Make a note of any amendments on your paper design.

### Test

1. Present your prototype for testing under observation.
2. Between each test, discuss the following:
  - How did it work?
  - Did it meet the challenge? Was it successful?
  - What worked well? What didn't work well? Why?
  - How could the prototype be improve?